

How will climate change impact the energy supply? Empirical evidence from Poland

Despite the growing frequency of power outages in the context of climate change, little is known about the underlying causes of grid instability. In this study, we document and quantify previously overlooked factors contributing to unplanned electricity outages: upstream water temperature and water height. Using high-frequency data from the universe of utility outage reports and a novel instrumental variable—upstream water flow—we establish that both water temperature and water height significantly affect the likelihood of unplanned outages at the plant unit level. Moreover, we demonstrate that these effects are non-linear. Specifically, the probability of an outage exceeds 50% when upstream water temperature reaches 25°C, while for water height, the outage probability peaks at 50 cm and diminishes as water height increases. These effects are predominantly driven by older power plants, suggesting that the age and resilience play a critical role in its vulnerability to hydrological conditions.